TRANSPORT PHENOMENA AND PROTEIN PARTITIONING IN AQUEOUS TWO PHASE SYSTEMS

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The recovery and purification of biological products is one of the main areas of concern in biotechnological processes.

Aqueous two phase systems not only provide a gentle environment for bioactive proteins but also offer unique possibilities for downstream processing. Difficult mechanical steps can be replaced by an extraction process, allowing the separation of cells and cell debris from a soluble protein by partition into opposite phases. Chemical engineering classical methods of liquid-liquid extraction can be easily implemented to two phase aqueous systems. Among these, spray columns due to its simplicity - easy of construction and operation - are particularly attractive.

In order to design a spray column for protein separation, data on mass transfer coefficients of the proteins, dispersed phase hold-up, degree of mixing in both phases and droplet hydrodynamics are required. These parameters depend on phase velocities, physical properties of the phases, sparger design and spray column dimensions.

Also important when dealing with two phase aqueous systems is the cost of the substances used for phase formation - polymers less expensive than dextran are needed. Among these, starch derivatives, with a significantly lower price than dextran, have been reported.

This presentation will review the utilization of spray columns for protein purification in two phase aqueous systems. The influence of the design variables and the system composition, with particular emphasis on PEG/starch derivatives systems, on mass transfer mechanisms will be considered.

2nd RESEARCH CONFERENCE ON

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Fundamentals and Engineering Aspects of Protein Purification

Dourdan, France, 28 May - 2 June 1994

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